

REMARKS

Claims 29-43 are pending in the application. By this amendment, claims 29, 35, and 36 are amended to put a sharper point on the claims. Additionally, claims 30 and 43 are amended for article/antecedent basis agreement. Applicant requests reconsideration and allowance in view of the following remarks.

Interview

Initially, Applicant would like to thank Supervisory Primary Examiner Shah for the recent, fairly lengthy telephone interview during which the Examiners' assertion that there is contradiction between claims 29 and 35/36 was discussed. The explanation below as to why the claims are not contradictory repeats the explanation Applicant's representative gave during that phone interview, and it presents another, perhaps more-easily-understandable analogy to facilitate the Examiners' understanding of the claims' relationship to each other. Additionally, Applicant is rephrasing claims 35 and 36 strictly to facilitate such understanding.

Rejection Under 35 U.S.C. § 112

Claims 29-41 and 43 are rejected under 35 U.S.C. § 112, second paragraph on a variety of bases.

First, according to the Office Action, **claims 29 and 35/36** are contradictory and therefore indefinite because claim 29 specifies that maximum temperature is calculated using the first or second function, but then claim 36 specifies that a temperature rise – introduced in claim 35 as something that is added to a base temperature to obtain the maximum temperature – is calculated using the first or second function. Therefore, according to the Office Action, “both Tmax (as calculated in claim 29) and Trise (as calculated in claim 36) are calculated using the same said one function or said another function which implies that Tmax equals to Trise and Tbase is always zero.” Because this issue still exists even though the claims have been amended, Applicant respectfully refutes the analysis and traverses the rejection to the extent it is based on that analysis.

The Examiner's analysis is fundamentally flawed because it identically equates the expression “calculated using” (now expressed as “calculating using”) with the expression “defined to be,” i.e., it is an interpretation that would have “calculated using” \equiv “defined to be”.

That is erroneous because the expression “calculated using” is broader than, but can include, the term “defined to be.”

By way of analogy, Applicant’s undersigned representative explained to the Examiner, and subsequently to the Supervisory Primary Examiner, that one could say that a house is built “using” copper. Although it is highly improbable – but certainly possible – that a house would be built entirely from copper, copper certainly is used in the electrical circuits throughout the house (e.g., in the wires), and it may be used in the plumbing throughout the house, too. Therefore, even though many other building materials are also used to build the house, it is accurate to say that the house is built “using” copper. Accordingly, an independent claim directed to a house constructed “using” copper would not be inconsistent with a dependent claim specifying that the house includes electrical circuits and then a further claim, depending from the first dependent claim, clarifying that it is the electrical circuits in the house (introduced in the first dependent claim) that are the components which are made from copper (as introduced in the independent claim). Nor would the independent claim be inconsistent with yet another dependent claim specifying that the house includes plumbing conduits and then a further claim, depending from that dependent claim, clarifying that it is the plumbing conduits that are the components which are made from copper.

As another analogy, one could refer to making a pizza “using” tomatoes. According to many pizza recipes, one uses tomato sauce (either self-prepared or store-bought) along with other ingredients such as meats, cheese, and/or veggies. However, according to other pizza recipes such as for so-called “white pizza” or “pesto pizza,” the tomato sauce is omitted in favor of sliced tomatoes. See, for example, the recipe at

http://find.myrecipes.com/recipes/recipefinder.dyn?action=displayRecipe&recipe_id=1108196 .

In either case, however, regardless of whether the tomatoes have been pulverized into tomato sauce or simply sliced up and put directly onto the crust as otherwise-whole tomatoes, it is accurate to say that the pizza is made “using” tomatoes. In that case, an independent claim directed to a pizza made using tomatoes would not be inconsistent with a dependent claim specifying that the pizza includes sauce and then a further claim, depending from the first dependent claim, specifying that the sauce is made using tomatoes, i.e., that it is the sauce component of the pizza (introduced in the preceding claim) in which the tomatoes are used (as introduced in the independent claim). Nor would the independent claim be inconsistent with a

further dependent claim that specifies that the tomatoes are simply sliced and placed in otherwise-whole form onto the crust.

A similar arrangement or relational construct applies to the pending claims, too. As is clear from the totality of the disclosure and from the independent claims, heating-induced damage is assessed by keeping track of how many times each of a number of different maximum temperature values (T_{max}) is encountered. In the disclosed, exemplary embodiment of the invention, once F_o has been determined, T_{max} is determined in two or, depending on how finely one parses things, three steps. First, as illustrated in Figures 2 and 3, the parameter $(\Delta T/\Delta T_o) - 1$ is determined for a given heat-inducing loading cycle from the appropriate function, depending on the value of F_o . From that parameter $(\Delta T/\Delta T_o) - 1$, the temperature rise ΔT associated with the cycle is determined. This constitutes the first step (or the first two steps if things are parsed finely) in the process. Then, once the temperature rise ΔT has been determined, it is added to the base temperature (i.e., the temperature that exists at the beginning of the heat-inducing cycle) to obtain the maximum temperature value for the cycle, as illustrated in Figure 4. This constitutes the second step (or the third step, if things are parsed finely) in the process.

This particular exemplary approach to determining T_{max} is described in claims 29/35/36. Moreover, in this case, the different claim-referenced functions are used in the first part of the process for determining T_{max} , i.e., in the part of the process where the value for ΔT that is to be added to the base temperature is determined. However, just as it is accurate and without contradiction to state that a pizza is made “using” tomatoes even when it is later clarified that those tomatoes have first been pulverized into tomato sauce, it is accurate and without contradiction in this case to state in one claim that the maximum temperature is “calculated using” one function or another even when it is subsequently specified with greater particularity in a dependent claim that it is in the calculation of a temperature rise, which is added to a base temperature to obtain a maximum temperature, that the one function or the other function is actually used or “comes into play.” Accordingly, Applicant traverses this basis for the rejection and requests that it be withdrawn.

With respect to **claims 30 and 43**, according to the Office Action, each is vague and indefinite because “it is unclear whether the ‘*a given cycle*’ [of heat-generating loading recited in claim 30 or claim 43] is the same as the recited ‘*a given cycle*’ [of heat-generating loading

recited in claim 29 or claim 42, respectively].” Applicant has amended claims 30 and 43 to change “a” to “the.” Accordingly, Applicant requests that the Examiner withdraw that basis for the rejection.

With respect to **claim 41**, the Office Action asserts that it is vague and indefinite because the phrase “[the] signal that is indicative of the cumulative amount of heating-induced damage which has occurred to said rotary member specifies the amount of life remaining in said rotary member” specifies two mutually exclusive, and therefore contradictory, terms. Applicant disagrees with that assertion because it is based on an interpretation of the term “indicative of” that is too narrow, and it overlooks the fact that the “cumulative amount of heating-induced damage which has occurred” and “the amount of life remaining in [the] rotary member” are two different sides of the same coin.


For example, if one knows that a particular part being monitored has a useful life of, say, 50,000 driving miles, a signal telling the driver that the part has 20,000 driving miles left in its useful life will inherently inform the driver that 30,000 miles worth of useful life, or 60%, has been consumed. Thus, the signal actually informs the driver of both concepts – life remaining and damage accrued/life consumed – with just a single piece of information. Under claim 29, the signal that is indicative of the cumulative amount of heating-induced damage which has occurred could indicate the percentage of life that has been consumed (i.e., a direct expression of the amount of damage that has occurred); the percentage of life remaining, which is equal to 100% minus the percentage of life that has been consumed (i.e., an indirect expression of the amount of damage that has occurred); the actual amount of life that has been consumed, expressed in some relevant unit of measure such as miles driven, months of operation, etc. (another direct expression of the amount of damage that has occurred); or the actual amount of life remaining, again expressed in some relevant unit of measure such as miles driven, months of operation, etc. (another indirect expression of the amount of damage that has occurred). On the other hand, claim 41 limits the signal that is output to those of the indirect type, i.e., those which expressly identify the amount of life remaining and, thereby indirectly, the amount of life consumed/damage which has accrued (either as a percentage or as a scalar amount). Accordingly, Applicant traverses this basis for the rejection and requests that it be withdrawn.

Rejection Under 35 U.S.C. § 103

Claims 29-31, 33, and 35-43 are rejected under 35 U.S.C. § 103(a) based on Lauster et al., “Thermic Computations in Multiple-Disk Clutches.”¹ According to the Office Action, Lauster discloses, among other concepts recited in the claims, calculating the maximum temperature for a given cycle of heat-generating loading using one function if the heating parameter is less than a certain limit value and using another function if the heating parameter is greater than a certain limit value. Applicant traverses the rejection because that is incorrect.²

To support the assertion that Lauster discloses the claim-recited concept, the Office Action cites to page 7, second-to-last line, through page 8, line 2 of Lauster (English translation), where Lauster refers to one solution to the governing differential Fourier equation for heat flux into a clutch disk that uses the so-called heat source process, and to equation (8) at page 9, third paragraph, where Lauster refers to another solution to the governing differential Fourier equation. As the Office Action notes, Lauster points out that the first referenced solution (the heat source process-based solution) only applies when Fo is less than 0.5. What the Office Action fails to note, however, is that the very next sentence in Lauster states (emphasis added) that “in the important field of construction of automatic transmissions for passenger cars, the Fo numbers are generally larger than 0.5, [such that] the indicated solution approach for it [the heat source process-based solution] is ruled out.”

Subsequently, for that application, Lauster explains that

[f]or the region $Fo > 0.5$ which is important in the practice of automatic transmissions of passenger cars, the maximum boundary temperature  which

¹ The stated basis for the rejection is incorrect. The Examiner also relies on Fatemi et al. and asserts that it would have been obvious to modify Lauster to incorporate the teachings of Fatemi. (See page 6 of the Office Action.) Therefore, the basis for the rejection presumably should have been Lauster in view of Fatemi. That is, however, harmless error, as Lauster does not disclose what the Examiner asserts it discloses, as explained below, and Fatemi does not rectify that deficiency.

² The Office Action states that Lauster does not expressly disclose that the functions intersect at the limit value such that either function could be used to calculate the maximum temperature if the heating parameter is equal to the limit value, but it (the Office Action) asserts that that would have been obvious “to ensure that both solution functions will have the same value at $Fo = 0.5$ (i.e., both functions are intersected [sic] at $Fo = 0.5$) because, as Lauster et al. suggested in page 8 [sic], paragraph 2, an analytic solution (by Laplace transform) to equation (5) does exist to all Fo numbers including $Fo = 0.5$.”

occurs during an operating process was approximately ascertained using the formula from the diagrams. Accordingly for $Fo > 0.5$ the following applies

$$T_{H, \max} \approx T_m (1 + 0.15 Fo^{1.5}) \dots \dots \dots (8).$$

Those two passages in Lauster do not constitute disclosure of the claim-recited concept! Claim steps a) and b) are each performed for a given part for a given cycle of heat-inducing loading, and those two steps are repeated over the course of a multitude of cycles. Under claim step b), for the given part and in the context of the given cycle, the appropriate function to be used in connection with calculating the maximum temperature is selected based on the heating parameter, and the maximum temperature associated with the given cycle is calculated using the selected function. (Claim 29 has been amended to “bring out” or amplify that decisional/selection aspect of the method, which, Applicant submits, would have been understood or appreciated even without such amendment based on a proper reading of the application.)

Lauster, on the other hand, only discloses that different solutions to the differential Fourier equation exist, with the accuracy/applicability of each solution to the given situation at hand depending on the Fourier constant Fo . In marked contrast to the claimed invention, Lauster implies that only one solution (function) ever would be applicable to a given part, since Lauster indicates with respect to the first solution approach that it is “ruled out” when Fo is greater than 0.5, which, according to Lauster, is the (only) region applicable to automatic transmissions in passenger cars. Instead, according to Lauster, for automatic transmissions in passenger cars, a different solution approach would need to be employed. The problem here, however – and this is why Lauster does not disclose the claim-recited concept – is that Lauster provides no guidance at all as to how to handle the situation where the heating parameter associated with the given part is less than the limit value for some heating cycles and greater than the limit value for other heating cycles. (In this regard, it should be noted that Fo , which is the exemplary heating parameter used in the disclosed embodiments of the invention, varies directly with the amount of time for which the rotary member is subjected to a given heating cycle, such that even a modest change in the length of time for which the rotary member is subjected to heat-inducing loading can move the heating parameter from one “side” of the limit value to the other “side” of the limit value.) Therefore, because Lauster does not disclose selecting one function or another for a given cycle of heat-inducing loading on a given part, then using the selected function in calculating a

maximum temperature associated with that cycle, one of skill in the art who was faced with that situation (the heating parameter being less than the limit value for some heating cycles and greater than the limit value for other heating cycles) and who had only Lauster for guidance would be stumped as to how to proceed!

Thus, Lauster does not disclose the claim-recited concepts the Examiner asserts it discloses. Therefore, the Examiner has not established a *prima facie* case of obviousness; accordingly, Applicant traverses the rejection and requests that it be withdrawn.

Allowable Subject Matter

Claims 32 and 34 are indicated to be directed to allowable subject matter, assuming the rejections under 35 U.S.C. § 112 are overcome. In view of the foregoing, however, Applicant submits that all pending claims are in condition for allowance, and timely Notice to that effect is respectfully requested.

The undersigned representative authorizes the Commissioner to charge any additional fees under 37 C.F.R. 1.16 or 1.17 that may be required, or credit any overpayment, to Deposit Account No. 14-1437, referencing Attorney Docket No.: 7589.0150. PCUS00.

In order to facilitate the resolution of any issues or questions presented by this paper, the Examiner may directly contact the undersigned by phone to further the discussion.

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